

Translation

PATENT COOPERATION TREATY

PCT/EP2003/00314



PCT

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

10/505957

Applicant's or agent's file reference 2002-0305 P	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/003141	International filing date (day/month/year) 26 March 2003 (26.03.2003)	Priority date (day/month/year) 26 March 2002 (26.03.2002)
International Patent Classification (IPC) or national classification and IPC G03G 15/09		
Applicant OCE PRINTING SYSTEM GMBH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 11 August 2003 (11.08.2003)	Date of completion of this report 04 June 2004 (04.06.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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International application No.

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I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☐ the international application as originally filed.

☒ the description, pages 1-14, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of _____,
pages _____, filed with the letter of _____.

☒ the claims, Nos. 1-17, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. _____, filed with the letter of _____,
Nos. _____, filed with the letter of _____.

☒ the drawings, sheets/fig 1/5-5/5, as originally filed,
sheets/fig _____, filed with the demand,
sheets/fig _____, filed with the letter of _____,
sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

3. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

See attached sheet

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III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☒ the entire international application.

☐ claims Nos. _____

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. _____
are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. _____ are so inadequately supported
by the description that no meaningful opinion could be formed.

☐ no international search report has been established for said claims Nos. _____ .

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I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

This expert opinion makes reference to the following documents:

- D1: PATENT ABSTRACTS OF JAPAN, vol. 2000, no. 20,
10 July 2001 (2001-07-10) & JP 2001 083795 A
D1a: US 6 526 248 B1, post-published (2003-02-25),
family document of D1
D2: PATENT ABSTRACTS OF JAPAN, vol. 010, no. 199
(P-453), 6 May 1986 (1986-05-06)
& JP 60 2427669
D3: PATENT ABSTRACTS OF JAPAN, vol. 017, no. 600
(P-1637), 4 November 1993 (1993-11-04)
& JP 05 181366 A
D4: PATENT ABSTRACTS OF JAPAN, vol. 007, no. 249
(P-234), 5 November 1983 (1983-11-05)
& JP 58 132769 A
D5: PATENT ABSTRACTS OF JAPAN, vol. 1996, no. 11,
29 November 1996 (1996-11-29) & JP 08 179616 A
D6: PATENT ABSTRACTS OF JAPAN, vol. 1997, no. 05,
30 May 1997 (1997-05-30) & JP 09 026701
D7: PATENT ABSTRACTS OF JAPAN, vol. 017, no. 529
(P-1618), 22 September 1993 (1993-09-22)
& JP 05 142931 A
D8: WO 03 036393 A (cited in the application).

Continuation of Box I.5

Basis of the report

The amendments submitted with the letter of 3 May 2004
introduce substantive matter which, contrary to PCT

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I. Basis of the report

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Article 34(2)(b), goes beyond the disclosure in the international application as filed. The amendments are as follows:

- (i) The new independent claim 3 goes beyond a combination of the original claims 1 and 10. Furthermore, the features - namely that *the coating is composed of composite material* - of the original claim 9, to which claim 10 was subordinated, and also the final feature of claim 10 - namely that *the pores of the coating are at least partly filled with plastics* - have been omitted. The new combination of features resulting from the omission of features does not appear to be supported in the application as originally filed. On page 10 (see the second paragraph), the features of the present claim 3 are also mentioned only in combination with the aforementioned omitted features.
- (ii) The range of diameters in the new claim 5 cannot be derived from the application as originally filed. The original claim 11, upon which said feature is based, describes a range of 2 to 100 μm .

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: III.1

1. The claims include multiple independent claims in the same category, namely device claims 1, 2 and 3. The scope of protection of these claims appears to be overlapping in part and, in consequence, the claims are not concise (PCT Article 6).

On the other hand, the above claims contain different definitions of the invention and, as a result, it is unreasonably difficult to identify the subject matter for which protection is sought. Thus, said claims lack clarity (PCT Article 6).

In addition, the description contains an embodiment (see figure 3 and page 8) that cannot be assigned to any of the claims. In consequence, the claims are not consistent with the description, which gives rise to a further lack of clarity with regard to the exact subject matter for which protection is claimed (see also the PCT International Preliminary Examination Guidelines IV, paragraph III-4.3).

Consequent upon the lack of clarity in the above instances, it is not possible to carry out a meaningful, detailed examination.

2. Nevertheless, the following observations are made in respect of unity of invention and the relevance of the cited documents to the claims:

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: III.1

2.1 Unity of invention (PCT Rule 13)

The concept (device for conveying toner, comprising a rotatable roller having a roller sleeve with a coating) that is common to the three device claims, claims 1, 2 and 3, is well known (see prior art citations D1 to D6) and therefore cannot constitute the required single general inventive concept.

There is no apparent relationship among the remaining features (e.g. claim 1: depressions in the surface are filled with plastics; claims 2 and 3: roller sleeve has a coating of porous ceramics) that distinguish the three device claims (i.e. their "special technical features (PCT Rule 13.2)) over the aforementioned prior art citations, for example D6. Said features are neither the same nor related, nor are they based on a unifying, inventive statement of object (reducing adhesion of the toner to the surface of the roller sleeve *per se* is also well known from D1 to D6; moreover, this objective is achieved in D6 by means of increased roughness). Thus, the present claims appear to comprise at least two groups of inventions that are not linked by unity of invention (namely claim 1 and claims 2 and 3).

2.2 Relevance of the citations:

2.2.1 Document D6 discloses a magnet roller sleeve with a metal coating which is applied by means of a

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: III.1

flame spraying method, said coating having a relatively "high" degree of roughness and a structure produced by the flame spraying method. Filling the depressions with plastics is not known from D6 but, in the absence of further information concerning the properties of the plastics (for example, the anti-adhesive properties of the PTFE to which one reference is made), said feature can only be assessed as arbitrary and therefore lacking an inventive step.

Document D8 should also be noted with regard to claim 1. Said document (see for example page 38, lines 7-26) discloses all the features of claim 1. Although this document is post-published, it claims an earlier priority than the present application.

2.2.2 Document D7 also discloses a roller sleeve with a coating of porous ceramics but gives no detailed information with regard to roughness. However, these distinguishing features of claim 2 must also be regarded as arbitrary, except in their specific context, and without inventive value.

2.2.3 Document D5 discloses a composite material consisting of electroconductive particles and particles with low surface energy. However, D5 does not mention any ceramics spray coating as per claim 3. This distinguishing feature can be considered novel and inventive only in conjunction

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: III.1

with the missing or omitted features of the composite material and the partial filling with low surface energy plastics, which combination of features unites anti-adhesive properties, electroconductivity and mechanical stability.

2.2.4 The use of PTFE or its derivatives, as well as PFA, in the outer coating of a roller sleeve provided for the conveyance or dispensing of toner is well known for reducing the adhesion of toner (see for example documents D1 to D4).

Finally, from US 2002/028096 A1 there results a developer roll that comprises an electrically conductive shaft on which there is applied an elastic zone that is provided with a coating of resin. The elastic zone can be made of rubber, and the coating can be made of a resin that contains carbon. With this realization of the developer roll, with the use of single-component toner it is supposed to be achieved that given a high degree of electrical conductivity the roll can deform sufficiently, for example in contact with an intermediate carrier, and is elastic enough that it subsequently returns to the initial state.

In all these constructions of the cylinder sheath, the problem of the reduction of frictional work in the removal of toner from the cylinder sheath is not addressed.

In PATENT ABSTRACTS OF JAPAN, vol. 2000, no. 20, 10 July 2001 (2001-07-10) & JP 2001 083795 A, a developer cylinder is described in which the surface is coated with Teflon or with a PTFE or PTFE derivate. Carbon is added to the layer in order to obtain conductivity.

PATENT ABSTRACTS OF JAPAN, vol. 010, no. 119 (P-453), 6 May 1986 (1986-05-06) & JP 60 247669 describes a developer cylinder whose sheath is covered with a layer of PFA in which carbon powder is dispersed.

From PATENT ABSTRACTS OF JAPAN, vol. 017, no. 600 (P-1637), 4 November 1993 (1993-11-04) & JP 05 181366 A, there results a developer cylinder whose sheath comprises a metallic layer that contains PTFE.

PATENT ABSTRACTS OF JAPAN, vol. 007, no. 249 (P-234), 5 November 1983 (1983-11-05) & JP 58 132769 A discloses a method according to which a layer of PTFE is applied on the sheath of a developer cylinder.

PATENT ABSTRACTS OF JAPAN, vol. 1996, 29 November 1996 (1996-11-29) & JP 08 179616 A describes a sheath of a developer carrier that is covered with a resin layer containing conductive particles and particles having low surface energy.

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From PATENT ABSTRACTS OF JAPAN, vol. 1997, no. 05, 30 May 1997 (1997-05-30) & JP 09 026701 A there results a magnetic cylinder whose sheath is made of non-magnetic metallic material having electrical conductivity onto which a layer of non-rusting steel is thermally sprayed. The layer has a thickness of 10 to 100 μm , and has a roughness of 30 to 100 μm . In this way, the adhesion of the carrier to the magnetic cylinder is to be reduced, and a long lifespan is to be achieved.

PATENT ABSTRACTS OF JAPAN, vol. 017, no. 529 (P-1618), 22 September 1993 (1993-09-22) & JP 05 142931 A describes a developer cylinder having strongly insulating properties. This is achieved in that an insulating layer made of $\alpha\text{Al}_2\text{O}_3$ is applied, or a layer of aluminum oxide is sprayed on, in whose pores an insulating material is introduced.

From WO 03 036393 A, which does not enjoy prior publication, but has an older priority date, there results a cleaning device for developer cylinders. As a cleaning device a cylinder is used whose surface has a low mechanical energy. For this purpose, a Teflon layer can be applied onto the cylinder, or an insulating material can be introduced into recesses of a rough surface of the cylinder.

The underlying problem of the present invention is to indicate a device, comprising a cylinder having a sheath, for the transport of toner, constructed in such a way that a significant reduction of frictional work is achieved in the removal of the toner from the cylinder sheath.

This problem is solved according to the features of patent claim 1.

The problem of very high adhesive forces between the toner and the surface of the cylinder sheath, requiring a correspondingly high degree of frictional work for an adequate cleaning, is avoided by the use of a cylinder sheath having a particular design.

The properties of the surface of the cylinder sheath are set such that the adhesive forces to the toner are small. This can be achieved by selecting the surface energy of the sheath surface to be low. This also holds for metallic sheaths, made for example of high-grade steel or aluminum, which confer a very high degree of mechanical stability, but at the same time also have a high surface energy.

Developments of the present invention result from the dependent claims.

Claims

1. Device for transporting toners in an electrophotographic printing or copying device,
 - in which for the transport of the toners a rotatable cylinder (17) having a cylinder sheath (22) is provided,
 - in which the cylinder sheath (22) comprises a metallic layer having a surface (26) having a roughness such that peaks or columns (27) and recesses arise,
 - in which the recesses of the surface are filled with a plastic (25).
2. Device for transporting toners in an electrophotographic printing or copying device,
 - in which for the transport of the toner a rotatable cylinder (17) is provided having a cylinder sheath (22),
 - in which the cylinder sheath comprises a layer made of a porous ceramic material having a roughness of 20-80 μm .
3. Device for transporting toners in an electrophotographic printing or copying device,
 - in which for the transport of the toner a rotatable cylinder (17) is provided having a cylinder sheath (22),
 - in which the cylinder sheath comprises a layer (24) made of a porous, thermal, electrically conductive ceramic sprayed layer (28).
4. Device as recited in Claim 2 or 3,
in which the pores are filled at least partly with plastic.
5. Device as recited in Claim 3 or 4,
in which the pores have a diameter of 20-100 μm .
6. Device as recited in one of the preceding claims,
in which the plastic is made of PFA.
7. Device as recited in one of Claims 1 to 5,

AMENDED PAGE

in which the plastic is PTFE or a PTFE derivate.

8. Device as recited in one of the preceding claims,

in which the layer comprises a volume resistance in the range up to $10^9 \Omega\text{cm}$.

9. Application of the device as recited in one of the preceding claims, as a magnetic cylinder for transporting developer to a toner deposition unit in the developer station of an electrophotographic printing or copying device.

10. Application of the device as recited in one of Claims 1 to 8, as a cleaning cylinder for a toner deposition unit.

11. Developer station in an electrophotographic printing or copying device,

- in which a transfer cylinder (32) transports a developer comprising toner and carrier to an applicator cylinder (31),

- in which the applicator cylinder (31) takes over the toner from the developer and transports it past an intermediate carrier,

- in which, adjacent to the applicator cylinder (31), there is situated a cleaning cylinder device (34), according to one of Claims 2 to 8, that cleans residual toner and developer from the applicator cylinder (31).

CHI\4174410.1 DRAFT